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SOLAR SYSTEM EXPLORATION IN THE NEXT DECADE

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Abstract:

Over the next decade, the planetary exploration program will be characterized by frequent flights

across the Solar system, permanent presence on Mars and sample return from the nearby bodies.

Text:

A major change is taking place in the approach to the exploration of our Solar system. Advanced technology is becoming more central to a bold strategy of frequent highly capable missions with ambitious objectives such as: in-situ and subsurface exploration, sample return, surface and atmosphere i.e., mobility, cooperative networks and high speed travel.

The overarching scientific theme for the next decade is to better understand the building blocks of the Solar System and the associated prebiotic chemistry with the hope of understanding the potential of past or future evolution of life. This goal has led to a strategy of a series of missions to study and sample comets, probe the surface of Europa in search of subsurface oceans, explore the surface and immediate subsurface of Mars, return samples from Mars, comets, asteroids, solar wind and possibly other bodies for detailed analysis, and map Pluto and its satellite Charon.

A number of missions are planned to survey half a dozen of comets, land on some of them, and return samples from the nucleus and the tail. In addition samples will be acquired from asteroids.

A Europa orbiter will be launched in 2003 with the objective of determining the presence and extent of a subsurface ocean or oceans. This mission will lay the groundwork for a potential lander mission with capability of subsurface sounding and probing.

Mars will be a major focus of planetary exploration in the next decade. Half a dozen landers will be deployed on the surface for in-situ studies and sample acquisition for return to Earth. A network of telecommunication and navigation orbiters will be put in place to support extensive surface networks and crafts which will establish permanent robotic presence on the

surface and layout the ground work for possible human exploration in the second decade.

The Pluto Kuiper Mission and the Mercury Orbiter (Messenger) which will be both launched in 2004 will complete the detailed exploration of all the planets in our Solar System.

In order to achieve these missions within the next decade, a major investment is being undertaken in developing and demonstrating advanced miniaturized S/C (flying PC), highly capable propulsion system (electric propulsion and solar sails), highly efficient telecommunication networks (interplanetary internet), autonomous mobile systems (rovers, gliders and balloons) and light weight efficient sensor.

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